

REMARKS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 68-72, 74-79, 85, 87-93, and 98 are presently active in this case. Claims 1-37 were cancelled by a preliminary amendment, and Claims 38-67, 69-72, 80-84 and 97 were withdrawn from consideration as being directed to a non-elected invention. The present Amendment amends Claims 68 and 98 without introducing any new matter, and cancels Claims 38-67, 73, 80-84, 86, and 94-97 without prejudice and disclaimer.

The September 24, 2010 Office Action rejected Claims 68, 73-75, 78, 85, and 87-93 under 35 U.S.C. § 102(e) as being anticipated by MacNamara et al. (U.S. Patent No. 6,841,848, hereinafter “MacNamara”). In addition, Claims 68, 76, 86, and 94-96 were rejected based on the reference Oi et al. (U.S. Patent Publication No. 2003/0092244, now U.S. Patent No. 6,830,985, hereinafter “Oi”), and Claim 68 was also rejected under 35 U.S.C. § 102(e) as being anticipated by Iyer et al. (U.S. Patent No. 5,937,312, hereinafter “Iyer”). Claims 77 and 79 were rejected under 35 U.S.C. § 103(a) as being unpatentable over MacNamara. Claim 86 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Iyer, in view of Sakguchi (U.S. Patent Publication No. 2002/0068419).

In response to the withdrawal of Claims 38-67, 80-84, and 97 as being directed to a non-elected invention, Claims 38-67, 80-84, and 97 are cancelled without prejudice or disclaimer. Applicants reserve the right to present claims directed to the non-elected inventions in a divisional application, which shall be subject to the third sentence of 35 U.S.C. § 121.

Applicants’ independent Claim 68 is amended to clarify that the first wafer includes a lower layer having no circuits and components, and an upper transplant layer arranged at least under the frontal side of the first wafer, with the transplant layer having at least one of

circuits and components. Moreover, Claim 68 is amended to recite that the material is eliminated in a peripheral area of the first wafer. These features find non-limiting support in Applicants' Figure 3, and in the specification at page 10, lines 9-27. No new matter has been added. Dependent Claim 98 is amended for consistency with independent Claim 68, and Claims 73, 86, and 94-96 are cancelled for having some features that may conflict with Applicants' amended independent Claim 68.

In response to the rejection of the claims under 35 U.S.C. §§ 102 and 103, Applicants respectfully request reconsideration of these rejections and traverse the rejections, as discussed next.

Briefly summarizing, Applicants' independent Claim 68 is directed to a method of assembling a first wafer onto a second wafer, the first wafer including a lower layer having no circuits and components, and an upper transplant layer arranged at least under the frontal side of the first wafer, the transplant layer having at least one of circuits and components. The method includes the steps of eliminating material from the upper transplant layer and the lower layer from a frontal side of the first wafer in a peripheral area of the first wafer, over a thickness less than an entire thickness of the first wafer, but greater than an entire thickness of the upper transplant layer, after the at least one of circuits and components have been formed in the transplant layer; and assembling the upper transplant layer of the first wafer onto a second wafer after said eliminating material.

Turning now to the applied reference, MacNamara is directed to a method of manufacturing a composite semiconductor wafer. (MacNamara, Fig. 2, Abstract.) In MacNamara's method the device and handle wafers 9, 10 are stacked together to form a composite wafer 1 by anneal bonding. (MacNamara, col. 8, ll. 53-63, col. 9, ll. 55-58, Fig. 10.) After the composite wafer 1 is formed, a device layer 2 is formed from a device wafer 9 by etching the device wafer 9 down to a thickness t . (MacNamara, col. 10, ll. 5-9, Fig. 11.) It

is only after the step of anneal bonding device and handle wafers 9, 10 together, and the etching of device wafer 9 to a device layer 2 that the micro-mirrors 5 are formed into the device layer 2. (MacNamara, col. 10, ll. 9-17, Fig. 1-2, and 11.) MacNamara also explains how device wafer 9 is prepared, before the etching to form a device layer 2, where material of the periphery of device wafer 9 is removed. In particular, MacNamara discusses that a plasma etch is performed to form peripheral recesses 25 that are not covered by a photoresist layer 23 to a depth D. (MacNamara, col. 9, ll. 32-37, Figs. 8-9). In other words, in MacNamara, there are no devices in his device wafer 9 at time of forming the recesses 25.

The pending Office Action stated that “since (9) is a device wafer, it has at least one of circuit and components.” (Office Action, p. 2, ll. 20-21.) But this statement is incorrect, because MacNamara clearly explains that the device wafer is made of single crystal silicon, and that the devices, namely the micro-mirrors 5, are formed *after* forming the composite wafer 1 by bonding the device wafer 9 and handle wafer 10 together. (MacNamara, col. 8, ll. 17-18, col. 10, ll. 13-17.) Accordingly, MacNamara fails at least to teach a step of eliminating material from the upper transplant layer and the lower layer from a frontal side of the first wafer after the at least one of circuits and components have been formed in the transplant layer, as required by Applicants’ amended independent Claim 68.

The reference Oi, used by the pending Office Action to form another rejection of Applicants’ independent Claim 68, fails to remedy the deficiencies of MacNamara. The reference Oi is directed to a method for producing a bonded dielectric separation wafer made of two wafers 10 and 20, where dielectric isolation grooves 13 are etched into a silicon wafer 10, after the wafer 10 has been coated with a mask oxide film 11. (Oi, Figs. 2a-2d, col. 7, ll. 38-55.) However, in Oi, the wafer 10 and oxide film 11 has no components, and is merely a mask that is later removed. (See Oi, Fig. 2d, col. 7, ll. 53-56.) Moreover, the bonded wafer is formed by between wafer 10 with grooves 13 and wafer 20 by a high-temperature bonding.

(Oi, from col. 10, l. 66, to col. 11, l. 9, Figs. 3g-3i.) Then Oi explains that the peripheral portions of the bonded wafers 10, 20 are beveled by a cutting process. (Oi, col. 11, ll. 10-17.)

However, Oi fails to teach a step of eliminating material from the upper transplant layer and the lower layer from a frontal side of the first wafer in a peripheral area of the first wafer, *after* the at least one of circuits and components have been formed in the upper transplant layer, as required by Applicants' independent Claim 68. First, the grooves 13 that were formed in wafer 10 are not arranged in the peripheral area of wafer 10, and second, they are also not formed after "at least one of circuits and components have been formed in the upper transplant layer." Oi clearly explains that his last steps of the method is to form devices, in a "device manufacturing process." (See Oi, col. 11, ll. 27-32.) Oi's "device manufacturing process" is made after the bonding of wafers 10 and 20, and after the grooves 13 were formed.

The reference Iyer that was used by the Office Action to form another rejection of Applicants' independent Claim 68, fails to remedy the deficiencies of MacNamara and/or Oi. Iyer describes a process, where a device wafer 20 having a device layer 22 and a handle wafer 24 are bonded together by annealing to form a bonded wafer 30. (Iyer, Abstract, Fig. 3, col. 3, ll. 33-40.) The device layer 22 is previously deposited onto the device wafer 20, and is made of between 0.5 to 50 μm thick semiconductor layer of either n or p⁺ type. (Iyer, from col. 2, l. 66, to col. 3, l. 10.) Moreover, after the bonding of device wafer 20 with handle wafer 24 to form bonded wafer 30, the periphery can be trimmed by polishing to form beveled edges 40. (Iyer, col. 5, ll. 37-48.) Iyer explains many variants of removing the device wafer 20 to expose the device layer 22, to minimize any chemical or physical damage to the device layer 22. (Iyer, cols. 3-6.) Iyer's goal is to keep the exposed surface of the device layer 22 intact, (Iyer, col. 3, ll. 52-65.) and to avoid activation of the device layer's surface by an etchant, (Iyer, from col. 5, l. 54, to col. 6, l. 11, Fig. 7) so that a nearly defect-

free device layer 22 is created. (Iyer, col. 1, ll. col. 42-50.)

However, it is clear that Iyer's device layer 22 is made of a pure semiconductor without yet having any devices therein. His method is actually directed to make a bonded wafer with a handling wafer 24, and a pure semiconductor layer 22, that can later be used to make devices therein. (Iyer, col. 2, ll. 3-28.) Therefore, the Office Action's statement "since (22) is a device layer, it has at least one of circuits and components" is respectfully traversed, because Iyer's method produces a bonded wafer for making a bonded wafer with a defect-free, mono-crystalline device layer 22, that may later be used to include devices. (Office Action, p. 5, ll. 17-18). Therefore, Iyer fails to teach a step of eliminating material from the upper transplant layer and the lower layer from a frontal side of the first wafer in a peripheral area of the first wafer, after the at least one of circuits and components have been formed in the transplant layer, as required by Applicants' independent Claim 68. Moreover, Iyer also fails to teach that the step of assembling the transplant layer of the first wafer onto a second wafer is performed *after* said eliminating material, as further recited in independent Claim 68. In Iyer, the trimming of the periphery to form beveled edges 40 is performed after the bonded wafer 30 is formed.

Therefore, the applied references MacNamara, Oi, and Iyer fail to teach every feature recited in Applicants' Claim 68, so that Claim 68 is believed to be patentably distinct over MacNamara, Oi, and/or Iyer. Accordingly, Applicants respectfully traverse, and request reconsideration of the rejection based on these references.

Moreover, Applicants note that dependent Claims 69-72 depend directly or indirectly from independent Claim 68, but have been withdrawn from consideration as being directed to a non-elected species. In case independent Claim 68 would be held allowable, and the features of dependent Claims 69-72 do not conflict with Applicants' independent Claim 68, Applicants respectfully request rejoinder of dependent Claims as being part of the active

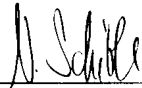
claims.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal Allowance. A Notice of Allowance for Claims 68-72, 74-79, 85, 87-93, and 98 is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact Applicants' undersigned representative at the below listed telephone number.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, L.L.P.



Philippe J. C. Signore, Ph.D.
Attorney of Record
Registration No. 43,922

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 07/09)

Nikolaus P. Schibli, Ph.D.
Registered Patent Agent
Registration No. 56,994